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Greek domestic equity funds: measuring performance and persistence in performance

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By Ioanna M. Tsaka

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Abstract

The present study investigates the performance and persistence in performance of Greek domestic equity mutual funds, using a survivorship-bias controlled sample of 66 funds for the period of 2005-2010. The methods applied for performance measure are the Jensen's alpha coefficient, based on Capital Asset Pricing Model (CAPM), the quadratic Treynor and Mazuy model and the Cubic model. The second empirical part includes a persistency test on the fund sample using again Jensen's alpha coefficient on six month horizon. The overall results suggest that Greek equity mutual funds have not been able to provide out-performance since alpha coefficients are insignificantly different from zero. In addition, there is no evidence of timing abilities by the fund managers. At a six month horizon, evidence of persistence for the whole sample (surviving, non-surviving funds) is observed.

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1. Introduction

The mutual fund industry has experienced remarkable growth on a global basis during the last two decades, becoming the primary vehicle through which individuals and most institutions invest in capital markets. Measuring fund performance remains a key issue in portfolio theory. Inappropriate performance measures may create incentives to managers, which, once aggregated, can lead to unfortunate anomalies in financial markets. Closely related is the issue of performance persistence. Performance persistence refers to the ability of a fund to maintain its performance ranking against a specific benchmark or against some fund over time. Obviously, it would be rather difficult to sell a mutual fund with a poor performance record to the public.

The present research attempts to examine the performance and the persistency of 66 equity mutual funds that operated in the Greek financial market during the period 1/1/2005-31/12/2010. The period of the study is the most recent one examined by Greek mutual fund researchers. In order to avoid the survivorship bias effect, all domestic equity funds, surviving and non-surviving are included. The empirical part of the study begins with the fund performance measures, using the Jensen's alpha coefficient. Treynor-Mazuy and the Cubic Timing model are used to assess the market timing ability and market timing performance of mutual fund managers for the aforementioned period. The second empirical part includes a persistency test on the fund sample using again Jensen's alpha coefficient. We estimate these alphas for each fund and then we classify, on an semi-annual basis, the fund as a Winner (W) or Loser (L) depending on whether they are ranked higher or lower with respect to average overall returns during these six monthly periods. The results will thus provide information concerning the fund performance and the presence or absence of persistence on semi-annual basis for the period 2005-2010. In a nut shell this research will focus on the following aspects of equity mutual funds in Greece:

- Do equity funds outperform the specific benchmark market index?

- Do fund managers in Greece exhibit 'timing' (time their investments in the market at a correct point of time) and 'selectivity' abilities (identifying the underpriced securities in the market)?
- Does the Greek equity fund market exhibit on average performance persistence? If so, is persistence characterized by 'hot hands' or 'icy hands'?
- What are the conclusions and implications for each case?

Due to time and word limit constraints, more models and tests could not be employed. Different models have different positive and negative aspects, thus the application of other suggested in the literature models could have provided us with more reliable results.

1.2 Organization of the Study

This study is organized into six sections and the remainder of this thesis is structured as follows: Section 2 provides the previous literature related to performance persistence of mutual funds and also presents an overview of the mutual fund industry internationally and especially in Greece. Section 3 explains the data set and the sources used. The fourth section describes the methodology applied in this study with a theoretical background. In the same section, we emphasize the limitations of the current study. Section 5 introduces the empirical results and discusses the findings. Finally, in the sixth section we conclude this thesis and suggest a couple of ways to further extend this study.

2 Literature Review and Industry Overview

2.1 Literature Review

In this section we briefly review the main contributions to the literature on performance persistence with special reference to American, European and finally the Greek mutual fund market. During the past decade the issue of persistence has attracted considerable attention leading to an extensive scientific literature, which is nevertheless primarily focused on US data sets but more recently there has been a growing interest in international markets as well. This survey is intended to cover the most indicative and influential papers and is by no means exhaustive.

Sharpe (1966) and Jensen (1968) in their studies introduced early measures of performance measurement. While Sharpe (1966) reported a significant relationship between the present and the past performance of mutual funds over 10-year horizons -from 1954 to 1963-, Jensen (1968) constructed his ratio for the evaluation of 115 mutual funds for the period 1945 until 1964 and concluded that future performance is not predictable. More particularly, the evidence on mutual fund performance indicated not only that these 115 mutual funds were on average not able to predict security prices well enough to outperform a buy-the-market and-hold policy, but also that there was very little evidence that any individual fund was able to do significantly better than that which he expected from mere random chance.

Treynor and Mazuy (1966) who examined the performance of 57 balanced and equity funds from 1953 until 1962 came to the conclusion that there is no evidence of over performance compared to the benchmark.

Carlson (1970), using risk-adjusted returns of 82 mutual funds for the period 1948-1967, found no evidence of persistence over 10-year horizons, and weak evidence for 5-year horizons.

Lehmann and Modest (1987) reported evidence of persistence for US equity funds between 1968 and 1982 using the Capital Asset Pricing Model (CAPM) and the

Arbitrage Pricing Theory (APT) as models of expected returns. Grinblatt and Titman (1989) using their index and the index of Jensen for the years 1975-1984 and argued that abnormal returns are not significant once transaction costs and manager fees are calculated.

Ippolito (1989) using a data set of 143 mutual funds for the period 1965-1984 found that before loads and after expenses the returns of mutual funds were slightly above the CAPM market line.

Brown et al. (1992) in analyzing the importance of survivorship bias, found that mutual funds that perform poorly relative to their peers are more likely to cease to exist. Hedricks et al. (1993) after examining a sample of 165 US open-end no-load equity funds in the period of 1974-1988, found a "hot hands" phenomenon in short run risk adjusted fund returns that are positively serially correlated up to four quarters. However, they found no evidence of persistence for longer period. Elton et al. (1996), using a sample of 188 equity funds designed to control for survivorship bias , reconfirm the "hot hands" phenomenon of Hedricks et al. (1993).

The study of Carhart (1997) had a significant impact on the literature introducing for the first time a new measure of performance which adjusts for risk factors. He indicates that "hot hands" is explained by one year momentum effect of Jegadeesh and Titman (1993). Carhart agrees that the only significant persistence not explained by his common factors is the under performance of the lowest performing mutual funds. His results do not support the existence of skilled mutual fund managers.

Droms and Walker (2001) found no evidence of persistence over long-horizons, while Bollen and Busse (2005) demonstrated positive short-term performance persistence from quarter to quarter. But the positive performance persistence (as with Carhart) disappears for longer investment horizons. They concluded that after considering transaction costs and taxes, investors may generate superior returns through a naïve buy-and-hold strategy over following a performance chasing strategy.

There is also some contribution of the literature on mutual fund performance persistence to be found on European studies. Examples are those of Blake and

Timmermann (1998), in examing UK equity funds by sub-sector over the period 1972-1995 using contingency tables, they recorded significant persistence, especially among small-firm equity funds.

Allen and Tan (1999) used a number of tests including the contingency table methodology on a UK sample of 131 funds between 1989 and 1995. They found that performance persisted even after adjusting for risk and for holding periods up to 2 years.

Other UK studies are those of Fletcher and Forbes (2002), who found no persistence using the Carhart measure and Cuthbertson et al. (2005) who argued that view managers authentic outperform, while most underperforming managers exhibit poor skills rather than bad luck.

Research on mutual fund performance persistence in other European countries are the studies of Dermine and Röller (1992) for France, Wittrock and Steiner (1995) and Otten and Schweitzer (1999) for Germany, Ter Horst et al. (1998) for Holland, Casarin et al. (2001) for Italy. All the former studies generally present inconsistent performance persistence or even no persistence at all for their respective national mutual fund markets. In addition, Cortez et al. (1999) examined persistence in Portuguese equity funds and reported that, if risk-adjusted returns are used, persistence disappears.

On the other hand, Grünbilcher and Pleschiutschning (1999) documented significant persistence, studying the performance of 333 funds, holding diversified European equity portfolios.

Finally, Otten and Bams (2002) performed the first European cross-country analysis of funds. The study included samples of 506 funds from 5 European countries (France, Italy, the UK, Germany and the Netherlands) for the period 1991-1998, and recorded weak performance persistence for European countries except for the UK.

The research on the Greek mutual fund industry is concentrated mainly on equity and balanced funds and most studies' focus is on fund performance. The study of Milonas (1995) used the Treynor-Mazuy model to measure the performance of 36 mutual funds operating in the Greek financial market for the period 1990-1993. He

concluded that these equity funds achieved returns higher than those of the General Index of the Athens Stock Exchange (ASE).

Artikis (2001a) evaluated 10 balanced mutual funds operating in the Greek financial market over the period 1995-1998 using Sharpe, Treynor, and Jensen measures. He concluded that none of these mutual funds achieved returns higher than that of the General Index of the ASE. The sample of the mutual funds achieved satisfactory returns in relation to both total and systematic risk undertaken, and although the ranking of the mutual funds varied among the techniques used, certain mutual funds were ranked in the same order regardless of the index used.

Artikis (2001b) examined the factors that best explain the performance of 42 bond funds. He concluded that adding the General Index of the Athens Stock Exchange to CAPM is improving its explanatory capability. On a more recent work Artikis (2004) tested a sample of 39 bond funds over a six month period for the year 1999. The research concludes that the proposed Bond Index approximates the market portfolio (Greek bond market) much better than the General Index of the Athens Stock Exchange.

Sorros (2003) evaluated the performance of 16 Greek equity mutual funds for the period 1995-1999 and found that four domestic equity mutual funds participating in the present research achieved lower return than that of the General Index of the ASE over the evaluation period. In addition, all sixteen mutual funds showed lower total risk, and risk-return coefficient than the General Index of the ASE.

Noulas et al. (2005) tested equity funds for the period 1997-2000 and found that there are big differences among equity mutual funds with respect to risk and return. In general, the higher risk is associated with higher return.

Dritsakis et al. (2006) examined the performance characteristics of Greek bond funds for the seven-year period 1997-2003 when the Greek stock market experienced extraordinary growth. The evidence showed that on average bond funds did not offer risk-adjusted profits exceeding the returns of the benchmark index.

Babalos et al. (2007), after using various measures and employing non-parametric tests, found evidence for persistence for specific periods but was not significant for the overall sample period 1998-2004.

Drakos and Zachouris (2007) collected a total of 88 domestic equity mutual funds that were in operation during the year period from 1995 until 2003 and conclude that persistence is sporadic and short-lived, indicating an underlying self-correcting mechanism in the Greek equity fund market.

Thanou (2008) examined the risk adjusted performance of 17 Greek equity funds for the period 1997-2005 during up and down conditions. She found that the mutual fund sample followed the market movements and finally no evidence of timing ability from fund managers was found.

Finally, Giamouridis and Sakelariou (2008) investigated the short-term performance of all Greek mutual funds in the period 2000-2007. The analysis showed that mutual fund performance does not persist over short-term horizons of any kind, i.e. monthly, bi-monthly, and quarterly. Contrary to prior studies in the Greek mutual fund industry they set up their screening processes so that both stock picking and market timing ability could be identified.

Table 1 and 2 summarize the findings from the aforementioned studies. Table 1 represents the studies mentioned in this section that applied persistence tests and measures, while table 2 presents some studies that have focused only on performance measures.

Table 1: Classification of literature - Focus on Persistence applied methods

Classification of the Literature						
Author	**Year**	**Period**	**Funds**	**Market**	**Persistence**	**Comments**
Sharpe	1966	1954-63	34	US	Yes	Past and Future rankings positively correlated
Jensen	1968	1945-64	115	US	No	Performance cannot be predicted
Carlson	1970	1948-67	82	US	Yes	Persistence in 5-year found but not in 10-year horizon
Lehman&Modest	1987	1968-82	130	US	Yes	Some evidence of abnormal return persistence
Grinblatt&Titman	1989	1975-84	279	US	Yes	Weak evidence on 5-year horizon
Hedricks, Patel and Zeckhauser	1993	1974-88	165	US	Yes	Persistence on quarterly basis
Elton, Gruber and Blake	1996	1977-93	188	US	Yes	Persistence in 1-year and 3-year horizon
Carhart	1997	1962-93	1892	US	No	Result is driven by the one-year momentum effect
Droms & Walker	2001	1971-90	151	US	Yes	No persistence over long horizons
Bollen & Busse	2005	1985-95	230	US	Yes	Persistence on quarterly basis
Blake & Timmermann	1998	1972-95	2300	UK	Yes	Short- term persistence
Allen & Tan	1999	1989-95	131	UK	Yes	Persistence even after adjusting for risk
Fletcher & Forbes	2002	1982-96	724	UK	Partial	Persistence due lack of risk adjustment
Cuthbertson, Nitzsche and O'Sullivan	2005	1975-2002	935	UK	Yes	Persistence attributed to "good luck"and not to manager skills
Cortez et al.	1999	1994-98	12	Portugal	Partial	Persistence only for raw returns
Casarin, Pelizzon and Schning	2001	1992-99	57	Italy	Yes	Persistence in short-term horizons
Grünbilcher & Pleschiutschning	1999	1988-98	333	EU	Yes	Persistence due to holding diversified European equity portfolios
Otten & Bans	2002	1991-98	506	EU	Yes	Weak performance persistence

Babalos, Kostakis and Philippas	2007	2000-2006	61	Greece	Yes	Persistence not significant for the overall sample period
Drakos & Zachouris	2007	1995-2003	88	Greece	Yes	Persistence is sporadic and short-lived
Giamouridis & Sakellariou	2008	2000-2007	All Greek MF	Greece	No	Mutual fund performance does not persist over short term horizons

Table 2: Classification of literature - Focus on Performance applied methods

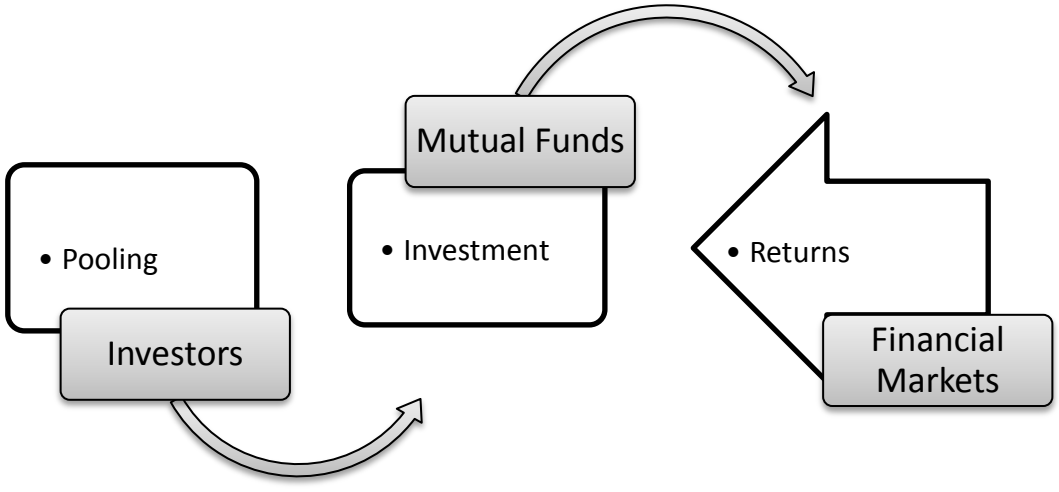
Classification of the literature						
Author	**Year**	**Period**	**Funds**	**Market**	**Performance**	**Comments**
Treynor & Mazuy	1966	1953-62	57	US	Underperformance	No evidence of over performance
Ippolito	1989	1965-84	143	US	Outperformance	Returns slightly above CAPM
Milonas	1995	1990-93	36	Greece	Outperformance	Equity fund returns higher than those of the Index
Artikis	2000	1995-98	10	Greece	Underperformance	No evidence of abnormal returns
Sorros	2003	1995-99	16	Greece	Underperformance	The sample showed lower total risk and risk return than the Index
Noulas, Papanastasiou and Lazaridis	2005	1997-2000	23	Greece	Underperformance	The Greek mutual fund market is too young to draw definite conclusions
Dritsakis, Grose and Kalyvas	2006	1997-2003	27	Greece	Underperformance	Average funds do not offer risk-adjusted profits
Thanou	2008	1997-2005	17	Greece	Partial	The mutual funds in the study followed the market closely

2.2 Industry Overview

2.2.1 How Do Mutual Funds Work? Definition and Categories

A Mutual Fund is an investment vehicle that is made up of a pool of funds collected from many investors for the purpose of investing in securities such as stocks, bonds, money market instruments and similar assets. Mutual funds are operated by investment professionals, who invest the fund's capital and attempt to produce capital gains and income for the fund's investors, complying with objective of that particular fund, as specified in the fund's prospectus. Their objective could be most commonly known; value, growth, or a blend of the two. More particular, mutual fund investors make money either by receiving dividends and interest from their investments, or by the rise in value of the securities. Dividends, interest and profits from the sale of any securities (capital gains) are passed on to the shareholders in the form of distributions. And shareholders generally are allowed to sell (redeem) their shares at any time for the closing market price of the fund on that day.

Figure 1: Mutual Funds act as an intermediary



Mutual funds have a really wide range of options to offer to investors and are usually classified according to their investment strategy. The main categories are:

- Equity Funds where investments concentrate in stocks,
- Bond Funds where corporate and government securities or municipal bonds form the core portfolio of these funds,
- Balanced Funds: These funds have an investment strategy which aims at striking a balance between debt and equity investments,
- Money Market funds that invest mainly in money market instruments, and
- Funds of Funds that invest in other mutual funds. The most popular type of this category is the so called Hybrid Fund.

2.2.2 A Brief History of the Mutual Fund

Mutual funds really captured the public's attention in the 1980s and '90s when mutual fund investment hit record highs and investors saw incredible returns. However, the idea of pooling assets for investment purposes has been around for a long time. Here we look at the evolution of this investment vehicle, from its beginnings in the Netherlands in the 18th century to its present status as a growing, international industry with fund holdings accounting for trillions of dollars in the United States alone.

2.2.2.1 In the Beginning

Historians are uncertain of the origins of investment funds; some cite the closed-end investment companies launched in the Netherlands in 1822 by King William I as the first mutual funds, while others point to a Dutch merchant named Adriaan van Ketwich whose investment trust created in 1774 may have given the king the idea. Ketwich probably theorized that diversification would increase the appeal of investments to smaller investors with minimal capital. The name of Ketwich's fund, Eendragt Maakt Magt, translates to "unity creates strength". The next wave of near-mutual funds included an investment trust launched in Switzerland in 1849, followed by similar vehicles created in Scotland in the 1880s.

The idea of pooling resources and spreading risk using closed-end investments soon took root in Great Britain and France, making its way to the United States in the 1890s. The Boston Personal Property Trust, formed in 1893, was the first closed-end fund in the U.S. The creation of the Alexander Fund in Philadelphia in 1907 was an important step in the evolution toward what we know as the modern mutual fund. The Alexander Fund featured semi-annual issues and allowed investors to make withdrawals on demand.

2.2.2.2 The Arrival of the Modern Fund

The creation of the Massachusetts Investors' Trust in Boston, heralded the arrival of the modern Mutual Fund in 1924. The fund went public in 1928, eventually spawning the mutual fund firm known today as MFS Investment Management. State Street Investors' Trust was the custodian of the Massachusetts Investors' Trust. Later, State Street Investors started its own fund in 1924 with Richard Paine, Richard Saltonstall and Paul Cabot at the helm. Saltonstall was also affiliated with Scudder, Stevens and Clark, an outfit that would launch the first no-load fund in 1928. A momentous year in the history of the Mutual Fund industry, 1928, also saw the launch of the Wellington Fund, which was the first Mutual Fund to include stocks and bonds, as opposed to direct merchant bank style of investments in business and trade. The concept of Index based funds was given by William Fouse and John McQuown of the Wells Fargo Bank in 1971. Based on their concept, John Bogle launched the first retail Index Fund in 1976. It was called the First Index Investment Trust. It is now known as the Vanguard 500 Index Fund. It exceeded 100 billion dollars in assets in November 2000 and became the World’s largest fund.

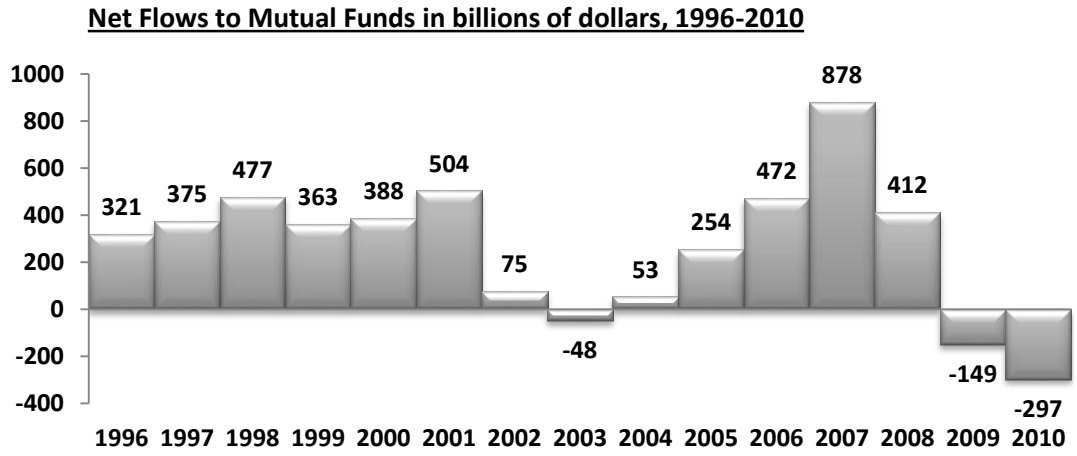
2.3 A Present Glance Worldwide

Fund industry growth continued into the 1980s and 1990s, as a result of three factors: a bull market for both stocks and bonds, new product introductions (including tax-exempt bond, sector, international and target date funds) and wider distribution of fund shares[1]. Among the new distribution channels were retirement plans. Mutual funds are now the preferred investment option in certain types of fast-growing retirement plans, specifically in 401 and other defined contribution plans and in individual retirement accounts (IRAs), all of which surged in popularity in the 1980s. Total mutual fund assets fell in 2008 as a result of the credit crisis of 2008.

Figure 2 gives us a very good picture as a reference to developments in mutual fund flows worldwide. Investor demand for mutual funds as measured by net new cash flow declined further in 2010. Overall, the industry had a net cash outflow of $297 billion. Abroad, many developed European countries experienced slower economic growth and weaker stock prices than that of the United States in 2010. Emerging markets experienced gains in stock prices that were about on par with the United States. It is interesting to notice that the amount of $297 billion total net outflow in 2010 was the largest on record in dollar terms.

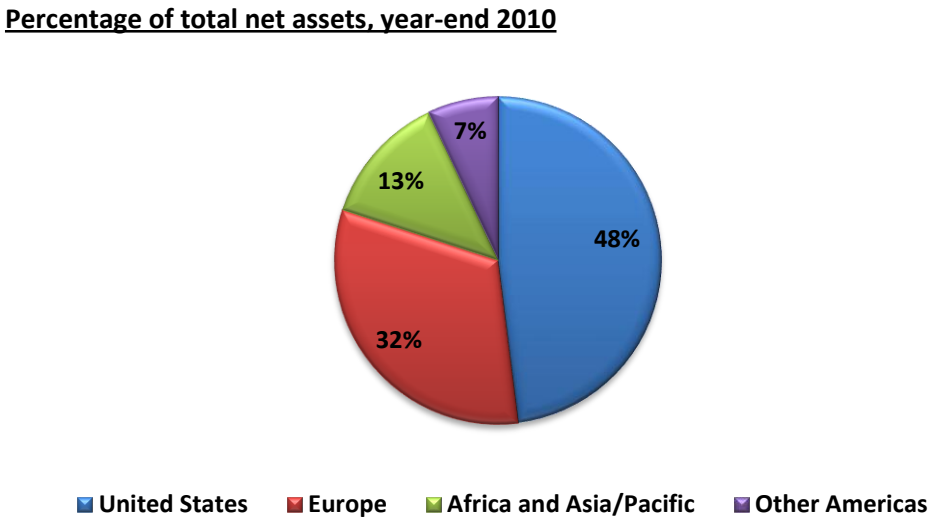
[1] Pozen Robert and Theresa Hamacher. 'The Fund Industry: How Your Money Is Managed'. 3rd ed. N.Y.: *John Wiley & Sons*, 2011, pp.11-25

Figure 2: Net flows to mutual funds in billions of dollars, 1996-2010[2]



In addition for the year 2010 the total net assets of the mutual funds worldwide amounted for $24.7 trillion dollars. By far the biggest proportion had the American mutual fund market with the percentage of 48% -$11.8 trillion (see figure 3) and as second biggest market followed the European one with 32% -$7.9 trillion.

Figure 3: The percentage of total net assets, year-end 2010[3]



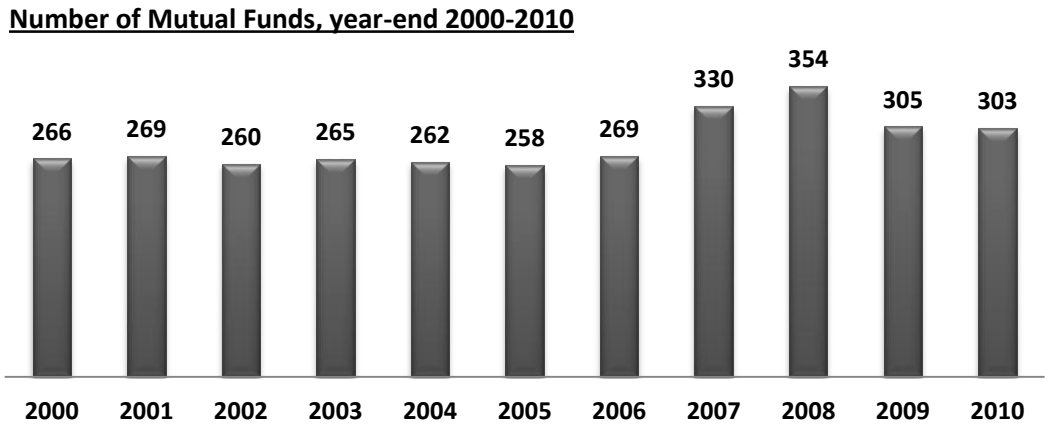
[2] Source:2011 Investment Company Fact Book , http://www.icifactbook.org

[3] Source: Investment Company Institute, http://www.ici.org

2.4 The Mutual Fund Market in Greece

The Greek fund industry was established in 1972 with the introduction of one equity and one hybrid fund[4]. The next years a series of political and economic events caused a recession in the Greek stock market. Over the next fifteen years no other mutual fund was introduced. In 1989, investors turned their attention to the mutual fund industry. This was mainly due to institutional changes in the Greek capital market and the positive behavior of the Athens Stock Exchange. After 1989, following institutional changes to the Greek capital market, the fund industry experienced rapid growth. While in 1985 there were only two state-controlled funds with nearly 4 billion drachmas under management, their assets increased to 7.32 trillion of drachmas in 1997 and in 8.64 trillion at the end of 1998. According to Hellenic Fund and Management Association by the year-end of 2010 there existed 22 fund companies, offering 303 mutual funds of all types and managing more than 8 billion euros. The figure below indicates the number of funds that operate in Greece for the period 2000-10.

Figure 4: Number of mutual funds in Greece[5]

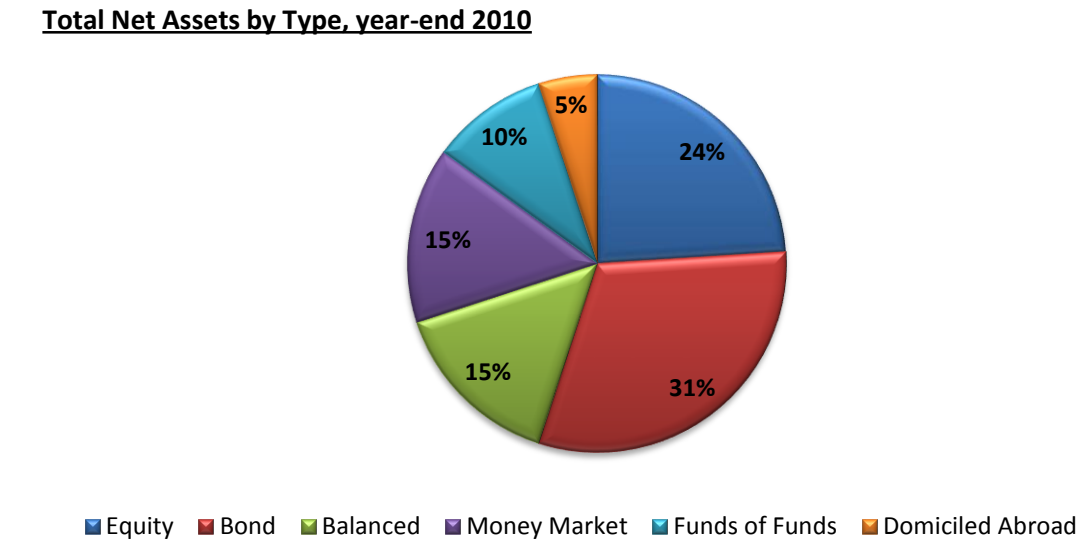


[4] See, Babalos et al. (2009)

[5] Source: Hellenic Fund and Management Association, http://www.ethe.org.gr

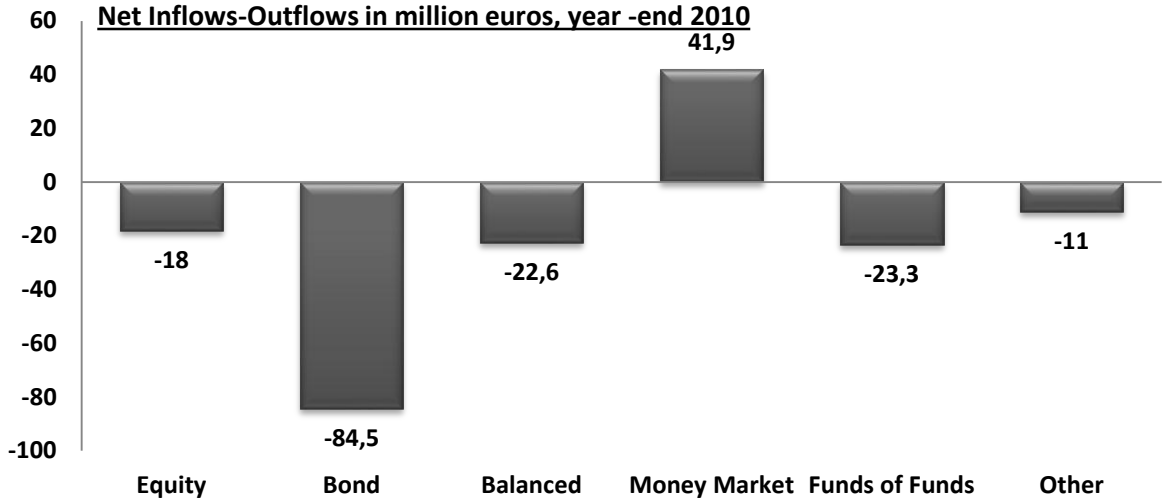
The next two figures depict statistic data for the year 2010. In the first one we see the total assets by category and that is 24% for equity funds, 31% bond funds, 15% money market and balanced funds, and 10% for fund of funds. In the second figure we observe the progress (net inflows-outflows) of each type separately.

Figure 5: Total net assets by type, year-end 2010[6]



[6] Source: Hellenic Fund and Management Association, http://www.ethe.org.gr

Figure 6: Net inflows-outflows in million euros, year-end 2010[7]



From the beginning of 2000 the mutual fund industry in Greece follows a continuous downward trend in total assets. From year to year (2000-2010) the number of total assets dropped from 30.9 billion to 8.1 billion euros approximately. For the year 2010 by category only the money market funds recorded inflows opposed to all other categories of funds.

In Greece, there are no institutions regarding the evaluation of mutual fund performance. The adoption of the foreign evaluation systems in the Greek case is troublesome. This is because evaluation systems developed for foreign markets are usually based on specific mutual fund categorizations, which do not fully comply with those used in the Greek case. Furthermore, a mutual fund evaluation system applied to a specific market should consider the characteristics and peculiarities of this market and the economic conditions of the host country, thereby making the development of a general fund evaluation system a difficult process.

[7] Source: Hellenic Fund and Management Association, http://www.ethe.org.gr

Greek mutual funds are classified as (a) money market funds, which invest mainly in the money market, (b) bond funds investing mainly in bonds, (c) equity funds, investing mainly in common stocks, (d) balanced type, investing both in stable stocks and bonds, (e) special type, investing in stocks that belong only to a specific industry or branch of the economy.

3 Data Set

The dataset employed for this thesis is the most recent available, spanning the period from 1/1/2005 to 31/12/2010 and is almost equally split into a bull and a bear market phase, thus covering different phases of the economic cycle. The empirical analysis uses returns of daily data of 66 equity mutual funds that operated in the Greek market for the six-year period 2005 to 2010. Funds with data spanning over the full six years and also funds that existed only for a shorter period during the whole sample period 2005 to 2010 are included. Like many other Greek studies on performance persistence the measure of the market level is the Official General Price Index of the Athens Stock Exchange, while as risk free rate we used the three–month Euribor rate for the particular period. The return refers to the average daily return achieved by the mutual funds under consideration. The daily returns for the period under consideration were calculated in the formula of Microsoft Excel using the following equation:

$$\boldsymbol{R_t = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}}} \qquad (1)$$

Where,

R_t = Daily return of a mutual fund in the period t

NAV_t = Daily asset value per unit of the mutual fund in the period t

NAV_{t-1}= Daily net asset value per unit of the mutual fund in the period t

Income of any associated dividends is assumed to be reinvested thus incorporated in the fund NAV.

We utilized the Net Asset Value (NAV) of the domestic equity funds, the Athens Stock Exchange (ASE) returns as proxy by the General Index returns, and the risk-free rate as proxy by the three-month Euribor. The sources of data used for the evaluation of the mutual fund performance were mainly two, the Hellenic Institutional Investors Association which contains statistical information and publications for all Greek mutual fund companies and from the platform of Bloomberg which is available in the International Hellenic University.

The total output of this empirical analysis is provided either in the text or in Appendices at the end of the study since it was considered that having so many tables in the text would obstruct the flow of information. In the latter case, a summary of these outputs is included in the text.

As mentioned above, all the data were selected on a daily basis. However, some errors are inevitable because of unavailability of synchronous quotes for Euribor rates and Greek market closing prices, since these two markets do not close simultaneously. There were also instances where one day was bank holiday for the Greek market but not for the rest of Europe, where Euribor is decided upon, or vice versa. In this case, data were chosen with the criterion whether the Greek market was open.

3.1 Survivorship Bias

Survivorship bias occurs when data collected on funds only incorporates those funds which have survived the whole sample period. As the bottom dwellers are removed the result is that overall performance seems better than it really is. In addition, there are numerous possible reasons for funds performing average or above average, one of which might be excessive risk taking. Consequently the surviving population might consist of a large portion of risky funds. Brown, Goetzmann, Ibbotson and Ross (1992) have demonstrated that a sample which is tainted by survivorship bias will yield a phony facade of performance persistence. Another side to the coin which is not emphasized as much is that funds on the opposite side of the spectrum, which

have performed very well, merge with other funds or that the manager(s) leave and the fund closes, something which would bias the results negatively.
To limit a possible survivorship bias I have also included equity funds that were closed down at any point during the sample period 2005-2010. From the 66 equity domestic funds, 19 funds include data for the entire period and 47 funds include data for a shorter period of any time during the whole sample period.

4 Methodology

In this section I briefly explain the theories and methods that have been used in this thesis. Starting with the empirical part of this paper, I first measured the performance of the equity mutual funds using three methods: The Jensen's Alpha coefficient method, based on the Capital Asset Pricing Model ($CAPM$), the Market Timing model and the so called Cubic Timing model. The point of using different methods for the computation of fund performance lies in that the different measures shed light on different aspects of fund management. The results will thus provide information concerning which aspects of funds' performances it is that persist. After the performance measures and tests that I applied, I continued with the persistence tests, again using Jensen's alpha coefficient, in order to examine the hypothesis of persistence in performance. Section 4.1 analyses the three models of fund performance, with focus on the theoretical background while section 4.2 analyses the method of the persistence hypothesis. The last subsection 4.3 indicates the limitations of the research.

4.1 Performance Measures adopted to evaluate the performance of the Funds

4.1.1 Single –factor performance model: Jensen's alpha coefficient

The Jensen measure, also known as the Jensen differential performance index, Jensen ratio or Jensen's alpha, gives a measure of performance relative to a benchmark, the security market line. It states the difference between an asset's expected return and actual return. The expected return is computed using the capital asset pricing model, which specifies the return which is stipulated by the security market line. Graphically, the Jensen measure gives the vertical distance between a point on the security market line, corresponding to the asset's assumed risk, and the asset's actual return. In short, the Jensen measure quantifies the difference between the asset's actual return and the return which it, according to $CAPM$, should deliver due to its risk. A fund with a positive Jensen measure indicates that the manager has an ability of picking winning assets which yield high returns relative to the risk they add to the fund. The Jensen's alpha can be calculated as follows:

$$\boldsymbol{Jensen\ measure}: \boldsymbol{R_{it} - R_{ft} = a_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it}} \qquad (2)$$

Where R_{it} is the return on fund *i* in period *t*, R_{ft} is the return on the 90 day bank bill in period *t*, R_{mt} is the return on the relevant equity index in month *t* and ε_{it} an error term. The intercept α_i gives the Jensen alpha, which is interpreted as a measure of outperformance or underperformance relative to the used market proxy[8].

In order to calculate the Jensen's alpha coefficient, we utilized, the daily net returns of each fund for the six year period, the net returns of the index and the risk free rate first for the 19 funds that survived during the period under examination and then for the 47 non-surviving funds. As next, using the econometric program of E-Views, we run the above CAPM regression for each fund separately and finally

[8] See Jensen (1968)

recorded the Jensen's alpha coefficient for each fund: surviving and non-surviving. All the empirical results are presented and interpreted in the next main section.

4.1.2 Market Timing model

As discussed in the literature review of this research paper, market timing ability of the fund managers has a great impact on the performance of the mutual funds. It refers to the ability of the managers to anticipate the major moves in the stock market prices and accordingly adjust the composition of their portfolios. Keeping this important determinant of the mutual fund performance into consideration, one of the major markets timing ability model, the Treynor – Mazuy model, had been employed in order to identify if the fund managers really have the ability to speculate the market returns. This is also referred to as the "squared regression model".

The published mutual fund literature generally makes a distinction between security selection and market timing skills on the part of fund managers. Whereas the former one-factor model does measure selection it does not take into account the possibility that managers might change their investment strategies, which in turn causes changes in systemic risk. We, therefore, extend the one-factor model by adding a quadratic factor that is supposed to capture the possible non-linearity of fund portfolio and market returns. As we have already mentioned this model was originally proposed by Treynor and Mazuy (1966) and takes the following regression form:

$$\boldsymbol{R_{it} - R_{ft} = \alpha_i + \beta_i \left(R_{mt} - R_{ft}\right) + \beta_{iT} \left(R_{mt} - R_{ft}\right)^2 + \varepsilon_{it}} \quad (3)$$

The alpha in equation now measures a fund's security selection ability, whereas β_{iT} indicates a fund's market timing ability. Specifically, a significantly positive β_{it} is

consistent with superior market timing. The results derived from the market timing model are available in the fifth section .

4.1.3 Cubic Timing model

Although the quadratic timing model is widely used, several studies question the validity of it. For instance, Jagannathan and Korajczyk (1986) provide several specification tests based on higher moments. Specifically, they augment the quadratic timing model by an additional cubic term:

$$\boldsymbol{R_{it} - R_{ft} = \alpha_i + \beta_i \left(R_{mt} - R_{ft}\right) + \beta_{iT} \left(R_{mt} - R_{ft}\right)^2 + \beta_{ic} \left(R_{mt} - R_{ft}\right)^3 + \varepsilon_{it}} \quad (4)$$

If β_c is significant, it is argued that the quadratic timing model is misspecified. Adding the cubic term I run the above regression formula with the help of E-Views econometric program and recorded the results for each fund separately. Again the results are available in the next section. Apart from Jagannathan and Korajczyk (1986) the cubic timing model has been used from other authors as well. Bauer et al. (2006) applied the cubic model to New Zealand equity funds, and Hallahan and Faff (1999) and Holmes and Faff (2004) applied the cubic model to Australian funds, whose results are also interpreted in the corresponding section.

4.2 Persistence

The hypothesis that mutual funds with an above average return in one period will also have an above average return in the next period is called the hypothesis of persistence in performance. Measures of performance persistence try to identify to what extent fund performance during one period continues during the following period. Persistence in performance can be studied as follows:

- Group funds based on the previous period performance (selection period).

- Hold the funds over the subsequent period (holding period).
- Compare the funds for performance over that subsequent period.

If the funds show persistence in performance, active fund selection based on past performance may be of interest to individual investors. On the other hand, if there is no sign of persistence past information would have no value for investors.

As mentioned already in the literature review section, this topic has been well documented in the published finance literature. The results of the main contributions are going to be discussed compared to the results found in this paper.

To investigate whether persistence in mutual fund performance is also present in the Greek equity fund market, I rank all funds within a specific category (surviving-non surviving funds), based on past 6 month return. The one year-half of funds with the highest previous period return (selection period) go into portfolio 1 (Winners) and the one year-half of funds with the lowest past period return go into portfolio 2 (Losers). The remaining of funds go into two border portfolios (Winners-Losers and Losers-Winners). These four equally weighted portfolios are then held for their six month period before we rebalance them again based on their last return. This is continued throughout the sample period 1/1/2005-31/12/2010 until we get a time series of monthly returns on all four portfolios. Funds that disappear during the year are included until they disappear, after which portfolio weights are re-adjusted accordingly.

4.3 Limitations of the Research

In this research, in order to evaluate the performance of the equity mutual funds we have employed three risk adjusted performance measures, based on CAPM (which is a single factor model). In addition, Treynor & Mazuy model and Cubic Timing model were employed in order to measure the selectivity and timing abilities. However, it should be noted that no doubt, the R-square of the regression results indicates that the explanatory variables had great power to explain the dependent one (representing that the model fit) but adding more factors to the model could

improve the explanatory power of the model and provide us with more reliable and clear results. This is evident from the previous researches conducted on this aspect, among which Lehman & Modest (1987) and Grinblatt & Titman (1989). Another limitation of this research is the fact that management fees were not deducted from the fund's return and this means that whatever the outcome, the reader should take into consideration that once fees are deducted, funds underperform the market by the amount of fees managers charge the investor. Moreover, there are various parametric and non-parametric tests which examine the persistence hypothesis such as the Cross Product Ratio (CPR), the Pearson's statistic, the Spearman Correlation, the Kendall's Tau, etc. Finally, financial statistical tests to analysis the robustness of the possible persistence phenomenon are not applied in this research. Such tests are, Malkiel's (1995) Z-test, Brown's and Goetzmann's (1995) Odds Ratio, Kahn's and Rudd's (1995) x^2-statistic, etc. Due to time and word constraints, more models and tests could not be employed. Different models have different positive and negative aspects, thus by employing more and more models could have provided us with better and more reliable results.

5. Empirical Results/Analysis

Section 5 captures all the empirical results obtained from the methods listed above in the previous section 4. First we present the results from the performance tests and methods carried out – Jensen's Alpha coefficient, Market Timing ability model and Cubic Timing – and then we continue with the results of persistence test that has been used. Each method section summarizes 3 tables: the one is for the surviving funds, the second one is for the non-surviving funds and the third is for both surviving and non-surviving funds. Apart from the following tables in appendix the reader has the opportunity to view the performance of each fund separately for all

three performance measures. Simultaneously with the results of this survey, I also include results from other surveys in order to make comparisons and discussions.

5.1 Performance Results

5.1.1 Performance results using Jensen's Alpha Coefficient

Table 3 presents the summary statistics of the frequency distributions of the regression estimates for the parameters of the Jensen's Model given by equation (2). It gives an average for all the 19 domestic equity funds that have survived the six year period, using the sample data available for these funds over the sample study period 1/1/2005-31/12/2010. The table presents the mean, extreme values and the estimates of α, β and adjusted R^2.

Table 3: CAPM summary statistics of 19 surviving funds

Summary statistics of estimated regression for 19 surviving funds at .0% level of significance			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0025	-0.0113	0.0123
$\boldsymbol{\beta}$	0.8512	0.4589	1.0473
$\boldsymbol{adjusted\ R^2}$	0.8821	0.1759	0.9850

The average value of the excess returns from the market variable, given by β (sensitivity of the portfolio to the market), was only .8512. This demonstrates that the equity funds under the sample study, on an average tended to invest and hold portfolios which were less risky than the market portfolio. This further implies that if any comparison is made between the returns of the funds and that of the market index, such a comparison would be biased against the funds, until and unless adjustment is made for the disparity in the 'risk undertaken' in investing in each of the equity portfolios. The adjusted correlation coefficient, given by the Adjusted R^2 (representing the model fit) was .88 which indicates that CAPM equation moderately fits the data analysis for most of the mutual funds. In other words, the explanatory

variable is able to explain 88% of the excess returns of the funds. The average alpha for the equity funds is -.0025. When trying to annualize the average alpha from our high frequency data set we find 0.65% underperformance on average approximately, quoted before fees, which indicates that on average the funds earned about 0.65% less per year than they should have earned, given the level of systematic or un-diversifiable market risk. Thus, the model demonstrates that the predominance of the negative alphas implies that the equity mutual funds are not able to forecast the future security prices and consequently detect the underpriced securities in the market. And thus, are unable to outguess the Athens Stock Exchange market index. So, the surviving equity funds have on average underperformed the market.

Similarly, the summary statistics of the regression estimated of the 47 equity funds that have been closed down at any point during the sample period or began to function likewise, is given in table 4.

Table 4: CAPM summary statistics of non-surviving funds

Summary statistics of estimated regression statistics for 47 non-surviving funds at .0% significant level			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0076	-0.0493	0.0042
$\boldsymbol{\beta}$	0.7201	0.0117	1.0792
$\boldsymbol{adjusted\ R^2}$	0.6993	-0.0024	0.9896

Since, the average β of the data set is .7201, on an average these equity funds, like the surviving funds, are also less risky than the market portfolio. The average squared correlation coefficient, given by the adjusted R^2, is .70 approximately and thus indicates that the equation (2) fits the data set very closely. In other words, the explanatory variable is able to explain approximately 70% of the excess returns of the funds. The average alpha for the non-surviving funds was -.0076, which annualized provides an underperformance of -0.19%. As we see on average the non-surviving funds earned about .76% less than they should have earned given the

systematic risk of the market. In comparison to the surviving funds the non-surviving performed worst for the sample period 2005-2010.

Table 5 summarizes the statistics of estimated regression given by equation (2) for all the data set that I have gathered for the sample period.

Table 5: CAPM summary statistics of all funds

Summary statistics of estimated regression statistics for 66 equity surviving/ non-surviving funds at significance level of .0%			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0061	-0.0493	0.0123
$\boldsymbol{\beta}$	0.7578	0.0117	1.0792
$\boldsymbol{adjusted\ R^2}$	0.7519	-0.0024	0.9896

Taking into consideration the first table of this section we distinguish now after having included the non-surviving funds that alpha coefficient from -.0025 dropped to -.0061. In other words the performance of the mutual fund sample fell even more in comparison to the market portfolio and this makes sense because of the non-surviving funds that were included. The annualized alpha coefficient in this case is equal to 0.15%.

It should be noted that 100% of the results are significant (at 1% significance level).

This implies that we can conclude that whether the funds really outperformed or underperformed the market. In this case we conclude that according to the Jensen measure, mutual funds really underperformed the market during the period 2005-2010 especially when one considers the non-inclusion of management fees in our results.

5.1.2 Performance results using Market Timing model

Treynor & Mazuy model indicates the timing and stock selectivity abilities of the fund managers. A statistically positive value of the intercept term and the squared term coefficient β_{timing}, exhibit the existence of the selectivity and timing abilities,

respectively. On the other hand, the negative value indicates the inability of the fund managers to do the same. Table 6 shows the regression results from the estimation of Treynor Mazuy model for 19 surviving equity funds, using the Athens Stock Exchange general index as an approximation of the market portfolio, and the three-monthly Euribor rate for the specific time period as the risk free rate of return.

Table 6: Quadratic model summary statistics of surviving funds

Summary statistics of Treynor Mazuy model for 19 equity funds at .0% level of significance			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	0.0025	-0.0117	0.0122
$\boldsymbol{\beta_{market}}$	0.8332	0.4277	1.0895
$\boldsymbol{\beta_{timing}}$	-0.2088	-1.5948	1.0523
$\boldsymbol{adjusted\ R^2}$	0.8830	0.1779	0.9860

The coefficient β_{timing} in the regression results reflects the presence of timing abilities in the fund managers. Based on the results in table 6 we cannot detect significant timing ability as the timing coefficient for both equally weighted portfolios is insignificant. Estimating equation (3) for all individual funds confirms this finding: From 19 funds only 4 had positive timing coefficient but not significantly positive (see in appendix).

Table 7 captures the results of the estimation of Quadratic Timing, but this time for the non-surviving funds.

Table 7: Quadratic model summary statistics of non-surviving funds

Summary statistics of Treynor Mazuy Model for 47 non-surviving funds at .0% significance level			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0083	-0.0503	0.0071
$\boldsymbol{\beta_{market}}$	0.6255	-0.4233	1.1194
$\boldsymbol{\beta_{timing}}$	-1.5181	-9.4070	5.8472
$\boldsymbol{adjusted\ R^2}$	0.7159	-0.0044	0.9900

Again here the timing coefficient remains insignificant with an average of -1.52 however we observe some extreme observations but this may happen due to largest sample that is under examination. From the 66 equity funds only 12 appeared to

have positive timing coefficient while viewer have significant timing coefficients. (All results for each fund separately available in appendix).

Once again for both surviving-non surviving funds whose results are presented in the table below.

Table 8: Quadratic model summary statistics of all funds

Summary statistics of Treynor Mazuy model for 66 surviving/non-surviving equity funds at level of significance .0%			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
α	-0.0067	-0.0503	0.0122
β_{market}	0.6853	-0.4233	1.1194
β_{timing}	-1.1412	-9.4070	5.8472
$adjusted\ R^2$	0.7640	-0.0044	0.9900

Finally, the conclusion that we can derive from the last table is this: the model shows that the diversified equity schemes on average show negative timing skills. The ones which show are not statistically significant and thus, one cannot write them off as good security selectors. So, it can be concluded that maximum percentage of the mutual fund managers neither have the ability to select the undervalued stocks in the market nor can they be referred to as 'efficient market timers'. In addition, we also notice that the coefficient of determination R^2 is quite high, which means that the model interprets to a great extent the data. More interestingly, our earlier conclusions with respect to the alpha estimates remain valid. As we see on average the alpha coefficient is -.0067 and this means that equity funds are not able to forecast the future security prices and consequently detect the underpriced securities in the market. And thus, are unable to outguess the Athens Stock Exchange market index.

5.1.3 Performance results using Cubic Timing model

In order to estimate the cubic term for the six year fund sample, I used regression formula (4). The surviving fund results coming from E-Views are as follows:

Table 9: Cubic model summary statistics of surviving funds

Summary statistics of Cubic Timing model for 19 surviving funds at .0% level of significance			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0023	-0.0087	0.001
$\boldsymbol{\beta_{market}}$	0.8319	0.4439	1.0908
$\boldsymbol{\beta_{timing}}$	-0.6613	-7.4467	4.0404
$\boldsymbol{\beta_{cubic}}$	-2.4100	-9.8421	4.9452
$\boldsymbol{adjusted\ R^2}$	0.8870	0.1931	0.9862

At this point we are most interested at β_{cubic} coefficient and as we observe the mean value of it is insignificant with -2.41. The extreme values are -9.84 and 4.94 respectively. For the surviving funds the quadratic term is not misspecified and this is confirmed by the insignificant value of β_{cubic} coefficient.

Respectively, for the 47 non surviving funds, we observe the following results.

Table 10: Cubic model summary statistics of non-surviving funds

Summary statistics of Cubic Timing model for 47 surviving funds at .0% level of significance			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0072	-0.0484	0.0161
$\boldsymbol{\beta_{market}}$	0.6379	-0.2195	1.3177
$\boldsymbol{\beta_{timing}}$	-1.3544	-8.9719	8.7860
$\boldsymbol{\beta_{cubic}}$	-1.3731	-9.9529	9.1502
$\boldsymbol{adjusted\ R^2}$	0.7067	-0.0041	0.9900

In this case coefficient β_{cubic} on average is equal to -1.37 approximately; again a not significant value which means that for the non- surviving funds the quadratic term is not misspecified.

Finally mixing the surviving with non-surviving funds we get the following cubic model results.

Table 11: Cubic model summary statistics of all funds

Summary statistics of Cubic Timing model for 66 surviving/non surviving funds at significant level of .0%			
Coefficient	**Mean Value**	**Minimum Value**	**Maximum Value**
$\boldsymbol{\alpha}$	-0.0058	-0.0483	0.0161
$\boldsymbol{\beta_{market}}$	0.6938	-0.2195	1.3177
$\boldsymbol{\beta_{timing}}$	-1.1549	-8.9719	8.7860
$\boldsymbol{\beta_{cubic}}$	-1.6717	-9.9529	9.1502
$\boldsymbol{adjusted\ R^2}$	0.7586	-0.0041	0.9900

The cubic timing factor is insignificant for both equally weighted portfolios. Also, the quadratic factor remains insignificant. This is again supported by individual regressions as only approximately 10% (only 6 out of 66 equity funds: see in appendix) β_{cubic} coefficients are significant. These results indicate that for Greek funds the quadratic model is not severely misspecified. Therefore, I use the quadratic model to reach the conclusion that Greek domestic equity funds do not provide evidence in favor of market timing abilities. The observations with respect to the alpha estimates again remain valid. In addition, we also notice that the coefficient of determination R^2 is quite high (76%), which means that the model interprets to good extent the data. Finally, all the above conclusions are valid and significant which is also confirmed by the .0% significant level of all regression results.

5.1.4 Previous studies: a comparison

5.1.4.1 Jensen's alpha coefficient

Handjinikolaou (1980) analyzed the performance of the two mutual funds operating in the Greek financial market in the period 1973-1976. Assuming that these two mutual funds had international orientation, he modified the indexes proposed by Treynor, and Jensen using the Solnik's approach. He concluded that the sample mutual funds achieved return higher than the strategy of buy and hold securities traded in the Athens Stock Exchange (ASE).

Artikis (2002) evaluated the performance of seventeen equity mutual funds operating in the Greek financial market over the period 1/1/1995–31/12/1998 using daily, weekly, and monthly returns. Using Jensen's alpha coefficient he found that nine mutual funds achieved risk-adjusted excess return (α) higher than the expected return in the case of daily returns. The corresponding figures for either weekly or monthly returns were ten.

Noulas et al. (2005) evaluated the performance of 23 Greek equity funds during the period 1997-2000 and based on the Jensen measure only three funds had alpha intercepts that were statistically significant.

In our case, (see appendix), having included surviving and non-surviving funds for the period of 2005 to 2010, from 66 funds only 4 funds had positive alpha coefficient and generally speaking according to Jensen's measure the equity funds have underperformed in comparison to the ASE benchmark.

5.1.4.2 Quadratic model

Milonas (1995) used the Treynor -Mazuy model to evaluate the performance of mutual funds operating in the Greek financial market. The estimation results refer to 10 mutual funds of mixed and equity type for the period 1993 -1994 and 12 mutual

funds of mixed and equity type for the period 1995-1996 using as approach for the market portfolio the General Index of the Athens Stock Exchange (ASE). According to these findings it cannot be argued that mutual fund managers exhibit significant timing ability.

Fillipas and Psoma (2001) used the Quadratic Model to evaluate the performance (ability to time the market and select undervalued securities) of Greek equity mutual fund managers. The research includes 17 equity funds and the period under examination is 1/1/1995 -31/12/1998. The empirical evidence does not reveal any ability of the fund managers to time the market correctly or select undervalued securities. These conclusions are consistent with those reached by a number of researchers over a period of thirty years ranged from work of Treynor and Mazuy in 1966 to work of Gallo -Swanson in 1996[9]. According to the authors, this might be attributed to the lack of experience of the managers within the short period of life of the mutual funds in Greece. Recent literature on mutual fund performance has inquired into the qualitative characteristics of mutual fund managers such as age, education, experience, etc.

The latest study investigating Greek equity funds with the method of Market Timing came from Koulis et al. (2011) who examined the performance of fifteen Greek mutual equity funds. The data on which this study was based is monthly and refer to the period January 2000 to December 2008 and based on the timing model they concluded that the managers of the mutual equity funds under examination did not possess the ability to be correctly timed and did not possess the ability of an efficient selection of securities when the General Index of the ASE is used.

As we conclude, the results that have been presented in section 5, using newest sample data, coincide with previous results among the years. It should be noted that the Treynor- Mazuy Model employed in the research is an unconditional model. Previous studies such as Roy et al. (2003) suggest that the poor results of the unconditional timing models could be attributed to the common time varying values

[9] See, Fillipas and Psoma (2001), pp. 70-72

of the conditional betas (the regression coefficient) and expected market return. Other strict explanations may be the lack of experience of the managers within the short period of life of the mutual funds in Greece and finally, qualitative characteristics of mutual fund managers such as age, education, experience, etc.

5.1.4.3 Cubic model

Because the Cubic Timing model has not been used from Greek authors until now, we mention some previous studies coming from Australia and New Zealand.

Hallahan and Faff (1999) and Holmes and Faff (2004) apply the cubic model to Australian funds and indeed find results that question the validity of the quadratic model for Australian funds. The principal issue examined in the first paper is the market timing ability of a segment of the Australian investment fund industry, namely, equity funds, over the period 1988–1997. The approach followed involves running both quadratic excess returns market model and dual-beta excess returns market model regressions. The results suggest that for the sample over the period examined, there is little evidence of market timing ability. Furthermore, there is no clear dominance of one market timing model over the other. They did find however, that a cubic market model specification does fit the data quite well for nearly one third of the sample. To the same conclusion came Holmes and Faff (2004).

Bauer et al. (2006) applied the cubic model to New Zealand equity funds using a survivorship-bias controlled sample of 143 domestic and international equity funds for the period of 1990–2003. The cubic timing factor is insignificant for both equally weighted portfolios. Also, the quadratic factor remained insignificant and thus they could not detect significant timing ability.

In this paper using daily domestic equity data for the period 1/1/2005-31/12/2010, and applying the Cubic Timing model it is confirmed that the Quadratic model is not misspecified and thus, it can be concluded that maximum percentage of the mutual fund managers neither have the ability to select the undervalued stocks in the

market nor can they be referred to as 'efficient market timers'. These results coincide with those of Bauer et al. (2006).

5.2 Persistence Results

As mentioned in the corresponding section, in order to investigate whether persistence in mutual fund performance is also present in the Greek equity fund market, we rank all funds within a specific category (surviving-non-surviving), based on past 6 month return. The portfolios that have been constructed are four: In portfolio 1 (Winners) funds with the highest previous period return (selection period) are included (Winners) while in portfolio 2 (Losers) funds with the lowest past period return are included. The remaining funds go into two other portfolios. Table 12 reports the results of the exercise explained in the corresponding section. Three tables are included. The first one represents the surviving funds, the second one represents the behavior of the non-surviving funds and finally the third one mixes up the persistence results of both surviving and non-surviving funds. To rule out possible different levels of risk and time variation in risk I subsequently apply the unconditional one-factor model ($CAPM$) whose results of each fund separately are presented in appendices.

Table 12: Persistence test results of surviving funds

Surviving Funds	WW	LL	WL	LW
1/1/2005-31/12/2005	10	8	1	0
2nd year-half 2005 - 1st year-half 2006	3	3	7	6
1st year-half 2006 - 2nd year-half 2006	3	3	6	7
2nd year-half 2006 - 1st year-half 2007	1	8	0	10
1st year-half 2007 - 2nd year-half 2007	6	7	4	2
2nd year-half 2007 - 1st year-half 2008	5	9	2	3
1st year-half 2008 - 2nd year-half 2008	6	7	2	4
2nd year-half 2008 - 1st year-half 2009	8	7	2	2
1st year-half 2009 - 2nd year-half 2009	8	7	2	2
2nd year-half 2009 - 1st year-half 2010	8	6	2	3
1st year-half 2010 - 2nd year-half 2010	10	7	1	1
SUM	68	72	29	40

In the case of non-surviving funds we include mutual funds that have data for at least 2 consecutive semesters. 39 out of 47 funds are included. According to the results at a six month horizon for the six –year period we find a positive spread of losers over winners for domestic equity funds. This means that for the surviving funds the documented persistence in performance is mainly driven by 'icy hands', instead of 'hot hands'[10]. This means that funds that underperform in one period are likely to be underperforming funds in the following period. As we see in the next table the results for the non-surviving funds are reversed.

Table 13: Persistence test results of non-surviving funds

Non-surviving Funds	WW	LL	WL	LW
1/1/2005-31/12/2005	14	6	2	1
2nd year-half 2005 - 1st year-half 2006	11	4	4	5
1st year-half 2006 - 2nd year-half 2006	15	2	4	4
2nd year-half 2006 - 1st year-half 2007	18	6	1	0
1st year-half 2007 - 2nd year-half 2007	14	2	2	7
2nd year-half 2007 - 1st year-half 2008	10	1	4	3
1st year-half 2008 - 2nd year-half 2008	9	2	5	4
2nd year-half 2008 - 1st year-half 2009	14	7	3	2
1st year-half 2009 - 2nd year-half 2009	9	3	3	2
2nd year-half 2009 - 1st year-half 2010	9	4	2	1
1st year-half 2010 - 2nd year-half 2010	8	4	1	0
SUM	**131**	**41**	**31**	**29**

In this case, for the period under examination, we find evidence of persistence with a significantly positive spread of winners over losers. This, in the literature is mentioned as persistence driven by 'hot hands'[11] . There are various possible explanations for the fact that non-surviving funds display evidence of 'hot hands' persistence phenomenon. At this point there should be emphasized that the non-surviving funds are funds including data for a shorter period of any time during the whole sample period. Certainly, many of these funds have been removed because of bad performance, but it is a fact that many others may have been merged with other

[10] See, Hedricks et.al (1993)
[11] See, Hedricks et al. (1993)

funds. More particular, because the Greek market is oligopolistic and because of numerous mergers in the banking/financial system the last decade, the mutual fund market has shrunk. As a result, many funds that existed for a particular period may not exist for the next period, not because they were 'bad' funds but because they merged with other funds[12]. In addition, many of these funds may have appeared at the end of our period under examination and may exist until today. Finally, for both surviving and non-surviving funds the results are as follows:

Table 14: Persistence test results of all funds

Surviving/non surviving Funds	WW	LL	WL	LW
1/1/2005-31/12/2005	24	14	3	1
2nd year-half 2005 - 1st year-half 2006	14	7	11	11
1st year-half 2006 - 2nd year-half 2006	18	5	10	11
2nd year-half 2006 - 1st year-half 2007	19	14	1	10
1st year-half 2007 - 2nd year-half 2007	20	9	6	9
2nd year-half 2007 - 1st year-half 2008	15	10	6	6
1st year-half 2008 - 2nd year-half 2008	15	9	7	8
2nd year-half 2008 - 1st year-half 2009	22	14	5	4
1st year-half 2009 - 2nd year-half 2009	17	10	5	4
2nd year-half 2009 - 1st year-half 2010	17	10	4	4
1st year-half 2010 - 2nd year-half 2010	18	11	2	1
SUM	**199**	**113**	**60**	**69**

As expected, the final table testifies the fact that the whole fund sample shows evidence of persistence driven by 'hot hands'. Obviously, the difference between the first portfolio that represents the winners over two successive periods (WW) and the second portfolio that represents the losers (LL) over two successive periods is big. Summing up, at a 6 month horizon, for the whole sample period, we find a significantly positive spread of winners over losers for Greek domestic equity funds. It has to be noted that the documented persistence in performance is mainly driven by 'icy hands', instead of 'hot hands' indicating that funds that underperform (significantly negative alpha) in one period are most likely the ones to underperform in the next. Investors should therefore avoid these funds. In our case however,

[12] See, Dritsakis et al. (2006)

evidence of persistently out-performing the market funds (significantly positive alpha) is absent.

5.2.1 Previous studies: a comparison

Babalos et al. (2007) examined the performance persistence hypothesis for the domestic equity funds in Greece, for the period 1/1/1998-31/12/2004, using various measures, such as Jensen's alpha and Carhart alpha, and employing nonparametric tests, contributing to the literature of the international mutual fund industry. Evidence for persistence was found for specific periods but it was not significant for the overall sample period. Finally, there was no significant evidence for asymmetries between positive and negative persistence.

Giamouridis and Sakelariou (2008) used daily data for all Greek equity funds available for the time period 2000-2007. The objective of this study was to investigate the short-term performance of Greek mutual funds, i.e. quarterly performance but also monthly and bi-monthly. After applying parametric and non-parametric tests, the analysis showed that mutual fund performance does not persist over short term horizons of any kind, i.e. monthly, bi-monthly, and quarterly for the specific period.

As someone would notice, the results of this study showed evidence of positive persistence, contrary to the previous ones. This can be explained by the different methods that have been applied, the different sample periods and mostly, the differences among the sub-periods that persistence has been identified.

6 Conclusion and Recommendations

This thesis examined performance persistence of Greek equity funds investing in the Greek stock market during the time period from 2005 to 2010. Firstly, the general purpose of this study was a comprehensive reference to the financial literature of mutual fund performance persistence. Secondly, using traditional and innovative measures, the empirical objective was to compare the results obtained by using similar or/and different performance metrics and methodologies to find out whether the performance persistence truly exists for a time period that had not been examined until today.

First, we evaluated fund performance using the Jensen's alpha coefficient, the Market Timing model and the Cubic Timing model. The results showed that equity funds (surviving and non-surviving) underperformed the ASE market index for that period and that maximum percentage of the mutual fund managers neither have the ability to select the undervalued stocks in the market nor can they be referred to as 'efficient market timers'. Our evidence suggests that not only the equity mutual funds on an average are unable to predict security prices and detect the underpriced securities in the market, but also that the funds which are individually performing well, are not significantly able to do that. Thus, the funds on average did not do quite well to provide sufficient returns to their investors. Secondly, in order to test for persistence, I rank all funds within a specific category (surviving-non-surviving), based on past 6 month return, applying the unconditional one factor model ($CAPM$). According to the results, at a 6 month horizon, for the whole sample period, a significantly positive spread of winners over losers for Greek domestic equity funds was found. Interestingly surviving funds showed the reverse outcome: a positive spread of losers over winners. The history shows that the documented persistence in performance is mainly driven by 'icy hands', instead of 'hot hands' indicating that funds that underperform one period are likely to underperform in the next period. It seems that the degree and existence of persistence is dependent on time period

used in the analysis and on the other hand, partly dependent on the methodology employed.

6.1 Investment Strategies

Appropriate asset allocation, effective diversification, suitable fund selections. These are some of the fundamental goals that every investor should desire in a mutual fund portfolio. Whether an investor is in one of the various stages of asset accumulation or in asset withdrawal, these goals are necessary for mutual fund portfolios to be successful. Once the performance of the portfolios considered has been established, the goal is to find empirical evidence for the persistence of such performance over time. The existence of this possible phenomenon is not without interest, since it would provide a very useful tool for financial decision-makers in general to assess future investments. Thus, any financial investor could use past performance data for different portfolios to structure future investments on an appropriate basis. According to Ferruz et al. (2004), having substantiated the existence of performance persistence in the investment funds using statistical techniques, the possibility arises that someone may create simple and functional systematic investment strategies allowing the decision-maker, asset manager or investor to achieve higher returns than those that could be generated through random investment.

6.2 Recommendations for Further Research

As mentioned in the corresponding section, one can employ various other models on the same data set would provide us better results and may also confirm the results obtained from the present analysis. Despite the relatively extensive analysis, there are plenty of possibilities to further expand this thesis. When it comes to performance measurement the Fama and French (1993) three factor model is considered a better explanation of fund behavior. In addition to a value-weighted market proxy, this model includes two additional risk factors, size and book-to-market. Also, a further step would be the calculation of the management fees and the comparison between before and after fees returns. In our case, how worst would be the fund performance after fees are conducted? As far as the performance persistence measurement is concerned, it would be interesting to study other methods and tests as well, such as Cross Product Ratio (CPR), the Pearson's statistic (known as Theta; Θ), the Spearman Correlation, and the Kendall's Tau (T). Also, one could examine the data sample for a shorter period, i.e. monthly, bi-monthly, quarterly etc. and investigate to what extend the conclusions will be different. Finally, it would be interesting to know to what extent the performance persistence can be explained by the managerial skill. This could be estimated using e.g. bootstrapping analysis.

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Appendices

Appendix 1: Domestic Equity Fund Names Tables

Surviving Funds
AAAB
ALICO
ALICO INDEX FUND
ALICO MEDIUM & SMALL CAP
ALLIANZ AGGRESSIVE STRATEGY
ATE
ATTIKIS
ALPHA AGGRESSIVE STRATEGY
CRETE INVESTMENT
CYPRUS GREEK DYNAMIC
CITYFUND
DELOS SMALL CAP
DELOS TOP-30
EUROBANK INSTTUTIONAL PORTFOLIOS
INTERNATIONAL
MARFIN ATHENE
MILLENNIUM BLUE CHIPS
MILLENNIUM MID CAP
PROBANK HELLAS

Non-surviving Funds
AAAB
AAAB GREEK DEVELOPMENT
ALPHA ETF FTSE
ASPIS 21st CENTURY
ASPIS NOTHERN GREECE
ALPHA TRUST NEW STRATEGY
ATHENS TOP-20 INDEX FUND
ATTICA MARATHON
DELOS HI TECHNOLOGY
DELOS INFRASTRUCTURE & CONTRUCTURE
DELOS FINANCIAL
EUROBANK EFG (LF) FLEXY STYLE
EUROBANK EFG (LF)
EUROBANKEFG I (LF)
EUROBANK EFG I (LF)
EUROBANK GENESIS
EUROBANKMID CAP PRIVATE SECTOR 50 INDEX FUND
EGNATIA THESEUS
EUROPEAN RELIANCE
EUROPEAN RELIANCE NEW ECONOMY
ELTA
EUROPEAN RELIANCE OLYMPIC FLAME
GENIKI DEVELOPING COUNTRIES
GENIKI SELECTED VALUES
HSBC MEDIUM CAP
HLLENIC TRUST
HERMES PROTOPOROS
ING
ING DYNAMIC COMPANIES
ING INTERNATIONAL
ING INTERNATIONAL GREECE
INTERAMERICA OLYMPIAN
INTERLIFE
ING PIREUS
PIREUS DYNAMIC COMPANIES
INTERNATIONAL DYNAMIC COMPANIES
MARFIN MAXIMUM
MARFIN MEDIUM
MARFIN NEW MILLENNIUM
MARFIN PREMIUM
METROLIFE ANAPTIKSIAKI

METROLIFE INCOME
LAIKI
LAIKI SELECTED SECURITIES
P&K
PIREUS
PIREUS I

Appendix 2: Summary Statistics of Performance Measures

CAPM: Surviving Funds[13]			
Fund	**Coefficient**	**(Index-Rf)**	**R-Squared adj.**
ALIANZAS	-0.003381	0.869271	0.948721
AAAB	-0.003065	0.889488	0.959804
ALICO	-0.001675	0.934117	0.978118
ALICOIF	0.001326	1.047315	0.985056
ALICOMS	0.012376	0.458994	0.493638
ALPHAAS	-0.001449	0.935778	0.974635
ATE	-0.004726	0.821496	0.883112
ATTIKIS	-0.004687	0.823107	0.945607
CITYFUND	-0.001983	0.921837	0.976472
CRETEL	-0.003424	0.870145	0.968731
CYPRUSGD	-0.004277	0.831545	0.891858
DELOSSC	-0.0043	0.83662	0.909392
DELOSTOP30	-0.001191	0.948713	0.976934
EUROBANKIP	-0.011318	0.606753	0.175986
INTERNATIONAL	-0.002233	0.913836	0.973789
MARFINATHEN	-0.004188	0.831919	0.891497
MILENIUMBC	-0.00243	0.908515	0.971219
MILENIUMMC	-0.004353	0.832349	0.879863
PROBANKH	-0.002804	0.892056	0.976112

[13] Source: individual calculations using E-views Program and CAPM equation (2):
$\boldsymbol{R_{it} - R_{ft} = a_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it}}$ at .0% level of significance

Market Timing: Surviving Funds[14]				
Fund	**Coefficient**	**(Index-Rf)**	**(Index-Rf)^2**	**R-Squared adj.**
ALIANZAS	-0.003564	0.829147	-0.709483	0.949989
AAAB	-0.003069	0.888554	-0.016521	0.959778
ALICO	-0.001684	0.932136	-0.035031	0.978106
ALICOIF	0.001518	1.089562	0.747024	0.986078
ALICOMS	0.012234	0.427772	-0.551945	0.494774
ALPHAAS	-0.001534	0.917049	-0.331175	0.974869
ATE	-0.004971	0.767456	-0.955522	0.885494
ATTIKIS	-0.004672	0.824243	0.020078	0.945572
CITYFUND	-0.001964	0.926083	0.07507	0.97647
CRETEL	-0.003375	0.880819	0.188737	0.96884
CYPRUSGD	-0.004421	0.799918	-0.559235	0.892617
DELOSSC	-0.00449	0.794768	-0.74003	0.910797
DELOSTOP30	-0.00096	0.9995333	0.898601	0.978722
EUROBANKIP	-0.011728	0.516556	-1.594861	0.177952
INTERNATIONAL	-0.002317	0.895501	-0.324208	0.974024
MARFINATHEN	-0.004428	0.778993	-0.935823	0.893748
MILENIUMBC	-0.00235	0.925936	0.308038	0.97143
MILENIUMMC	-0.004623	0.772835	1.052314	0.882678
PROBANKH	-0.002934	0.863514	-0.504673	0.976739

[14] Source: individual calculations using E-views Program and equation (3):
$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \beta_{iT} (R_{mt} - R_{ft})^2 + \varepsilon_{it}$ at .0% level of significance

Cubic Timing: Surviving Funds[15]					
Fund	**Coefficient**	**(Index-Rf)**	**(Index-Rf)^2**	**(Index-Rf)^3**	**R-Squared adj.**
ALIANZAS	-0.003066	0.82643	1.69842	-0.709483	0.951136
AAAB	-0.00273	0.886704	-0.689704	-7.249095	0.96028
ALICO	-0.001793	0.93273	0.181163	2.328064	0.978142
ALICOIF	0.001289	1.090812	1.201964	4.898968	0.986247
ALICOMS	0.00992	0.44395	4.04047	4.94529	0.541967
ALPHAAS	-0.001499	0.916857	-0.400846	-0.750236	0.974858
ATE	-0.004563	0.76523	-1.765889	-8.726346	0.886245
ATTIKIS	-0.004001	0.820528	-1.331875	-1.455835	0.947988
CITYFUND	-0.001994	0.926247	0.134712	0.642241	0.976458
CRETEL	-0.002896	0.878207	-0.762007	-1.023797	0.969895
CYPRUSGD	-0.003576	0.795315	-2.234757	-1.804267	0.896026
DELOSSC	-0.004169	0.793018	-1.377112	-6.860341	0.911245
DELOSTOP30	-0.000889	0.999148	0.758466	-1.509025	0.978729
EUROBANKIP	-0.008779	0.500479	-7.446736	-6.301524	0.19319
INTERNATIONAL	-0.002214	0.894939	-0.528908	-2.204286	0.974054
MARFINATHEN	-0.004163	0.777549	-1.461421	-5.659834	0.894014
MILENIUMBC	-0.002341	0.925887	0.290214	-0.19193	0.971412
MILENIUMMC	-0.004421	0.771734	-1.453274	-4.317693	0.882797
PROBANKH	-0.002474	0.861003	-1.418656	-9.842119	0.977708

CAPM: Non-surviving[16]			
Fund	**Coefficient**	**Index-Rf**	**R-Squared adj.**
AAAB	-0.004501	0.836657	0.888834
AAAB GD	-0.004498	0.872298	0.94472
Alpha etf	0.001739	1.079273	0.981623
Alpha Trust NS	-0.005467	0.773165	0.897658
Aspis 21	-0.005529	0.75448	0.755881
Aspis NG	-0.003447	0.824525	0.887456
Athens Top-20	-0.002174	0.939244	0.948993
Attica Marathon	-0.005268	0.735444	0.859171
Delos F	-0.00355	0.887862	0.972095
Delos HT	-0.006313	0.816712	0.884936
Delos IC	-0.005248	0.846203	0.907868

[15] Source: individual calculations using E-views Program and equation (4): $\boldsymbol{\beta_i}\left(\boldsymbol{R}_{\boldsymbol{mt}}-\boldsymbol{R_{ft}}\right)+\boldsymbol{\beta_{iT}}\left(\boldsymbol{R_{mt}}-\boldsymbol{R_{ft}}\right)^2+\boldsymbol{\beta_{ic}}\left(\boldsymbol{R_{mt}}-\boldsymbol{R_{ft}}\right)^3+\boldsymbol{\varepsilon_{it}}$ at .0% level of significance

[16] Source: individual calculations using E-views Program and equation (2): $\boldsymbol{R_{it}}-\boldsymbol{R_{ft}}=\boldsymbol{a_i}+\boldsymbol{\beta_i}\left(\boldsymbol{R_{mt}}-\boldsymbol{R_{ft}}\right)+\boldsymbol{\varepsilon_{it}}$ at .0% level of significance

Egnatia T	-0.001958	0.934931	0.978724
ELTA	-0.00171	0.822244	0.91234
Eurobank FS	-0.007163	0.460489	0.347918
Eurobank Genesis	-0.003206	0.867107	0.828462
Eurobank LF	-0.014467	0.488235	0.246263
Eurobank LFI	-0.007097	0.457134	0.343248
Eurobank LFII	-0.021896	0.439453	0.179057
Eurobank Mid Cap	-0.014663	0.603748	0.11178
European Reliance	-0.015797	0.380044	0.15108
European RN	-0.007853	0.54511	0.523493
European ROF	-0.006817	0.623993	0.682866
Geniki DC	-0.009811	0.557433	0.414188
Geniki SV	0.0042	0.836594	0.948467
H Protoporos	-0.006069	0.792896	0.321835
Hellenic Trust	-0.001724	0.935623	0.976554
HSBC M	-0.0063665	0.7995	0.852766
ING	-0.001852	0.932101	0.987284
ING DC	-0.00419	0.848109	0.899916
ING I	-0.026481	0.37854	0.17254
ING International	-0.049345	0.011781	-0.002459
ING Pireus	-0.018438	0.138938	0.021949
Interamerican O	-0.005529	0.756283	0.896024
Interlife	-0.007482	0.770798	0.874231
International DC	-0.006164	0.819394	0.863045
LAIKI	-0.002008	0.920102	0.921125
LAIKI SS	-0.001565	0.947221	0.94433
Marfin Max	-0.006939	0.666374	0.585747
Marfin Med	-0.0011626	0.9348	0.900957
Marfin NM	-0.003842	0.849344	0.885771
Marfin P	-0.002799	0.91661	0.952829
Metrolife A	-0.004299	0.870902	0.978971
Metrolife I	-0.022829	0.32917	0.353028
P&K	-0.005393	0.842684	0.960421
Pireus	-0.003859	0.861538	0.90767
Pireus 1	0.000842	0.968421	0.989662
Pireus DC	-0.017377	0.170244	0.027687

Quadratic Timing: Non-surviving[17]

Fund	Coefficient	(Index-Rf)	(Index-Rf)^2	R-Squared adj.
AAAB	-0.006839	0.641964	-3.361425	0.895773
AAAB GD	-0.004555	0.8689976	-0.037491	0.944668
Alpha etf	0.001681	1.119454	0.712348	0.982535
Alpha Trust NS	-0.005443	0.744909	-0.500541	0.898315
Aspis 21	-0.006074	0.680213	-2.012529	0.749979
Aspis NG	-0.005351	0.568147	-6.911685	0.890643
Athens Top-20	-0.001607	0.97318	0.168252	0.949206
Attica Marathon	-0.005199	0.699912	-0.634697	0.860453
Delos F	-0.004074	0.87443	-0.152431	0.972115
Delos HT	-0.007348	0.754699	-0.712766	0.885903
Delos IC	-0.00606	0.797541	-0.55931	0.908413
Egnatia T	-0.001941	0.936202	0.020688	0.97869
ELTA	-0.004712	0.788651	-0.602629	0.913247
Eurobank FS	-0.006618	0.269583	-3.52806	0.404757
Eurobank Genesis	-0.004894	0.675904	-4.39587	0.831305
Eurobank LF	-0.014484	0.457725	-0.547872	0.246147
Eurobank LFI	-0.006545	0.266139	-3.540914	0.401192
Eurobank LFII	-0.02	0.607697	2.211476	0.18759
Eurobank Mid Cap	-0.013664	0.664905	0.713777	0.110598
European Reliance	-0.01177	0.717105	5.847236	0.1679941
European RN	-0.010208	0.236534	-8.209987	0.522347
European ROF	-0.008809	0.362943	-6.945503	0.68256
Geniki DC	-0.013188	0.194838	-7.781657	0.421686
Geniki SV	-0.004133	0.851505	0.263623	0.948628
H Protoporos	-0.006195	0.765777	-0.477286	0.321622
Hellenic Trust	-0.001625	0.957538	0.387477	0.976884
HSBC M	-0.006631	0.700381	-1.045602	0.856012
ING	-0.001849	0.933686	0.028493	0.987275
ING DC	-0.004266	0.814515	-0.603877	0.900774
ING I	-0.02421	0.547132	2.040471	0.18314
ING International	-0.05031	-0.056638	-0.434808	-0.004455
ING Pireus	-0.022723	-0.296617	-9.407091	0.040833
Interamerican O	-0.006954	0.6012	-3.371901	0.897912
Interlife	-0.007569	0.755647	0.874267	0.874267
International DC	-0.006722	0.78599	-0.383599	0.8632217
LAIKI	-0.003904	0.1771479	-2.420059	0.924034
LAIKI SS	-0.003516	0.80197	-2.240398	0.946681
Marfin Max	-0.008699	0.473445	-4.440407	0.588299
Marfin Med	-0.003828	0.762162	-2.811087	0.904679

[17] Source: individual calculations using E-views Program and equation (3):
$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \beta_{iT} (R_{mt} - R_{ft})^2 + \varepsilon_{it}$ at .0% level of significance

Marfin NM	0.007075	0.579808	-4.513219	0.904239
Marfin P	-0.0045	0.789953	-1.953616	0.954753
Metrolife A	-0.003813	0.903672	0.404625	0.979331
Metrolife I	-0.022033	0.382883	0.663204	0.355013
P&K	-0.004795	0.878481	0.411443	0.960749
Pireus	-0.003944	0.823701	-0.680172	0.908761
Pireus 1	-0.00791	0.990733	0.40109	0.990003
Pireus DC	-0.023217	-0.423365	-1.282074	0.58053

Cubic Timing: Non-surviving[18]

Fund	Coefficient	Index-Rf	(Index-Rf)^2	(Index-Rf)^3	R-Squared adj.
AAAB	-0.007629	0.509517	-8.496698	-5.229393	0.889283
AAAB GD	-0.005139	0.770841	-2.905676	-1.966732	0.947162
Alpha etf	0.001461	1.118467	1.096093	4.154496	0.982649
Alpha Trust NS	-0.004651	0.745002	-1.844782	-1.43413	0.900934
Aspis 21	-0.004141	1.317743	4.458039	9.150234	0.7552753
Aspis NG	-0.004581	0.832604	1.258106	3.8382	0.889283
Athens Top-20	-0.001942	0.913076	-1.3962	-1.235859	0.949993
Attica Marathon	-0.004802	0.702829	-1.330783	-7.53072	0.861146
Delos F	-0.00443	0.810551	-2.053061	-1.313747	0.973171
Delos HT	-0.007948	0.646949	-3.915058	-2.215576	0.889107
Delos IC	-0.006519	0.715269	3.0044	-1.691689	0.910171
Egnatia T	0.002391	0.866948	-2.526497	-2.517587	0.979035
ELTA	-0.004186	0.787423	-1.486164	-9.346704	0.914175
Eurobank FS	-0.006494	0.271718	-3.752305	-2.417921	0.403848
Eurobank Genesis	-0.00418	0.845764	5.025887	1.413363	0.831143
Eurobank LF	-0.011345	0.448894	-5.800784	-5.553014	0.272763
Eurobank LFI	-0.006453	0.267747	-3.70608	-1.77822	0.400222
Eurobank LFII	-0.017973	0.445932	-5.09634	-5.574745	0.203381
Eurobank Mid Cap	-0.015354	0.230273	-1.319739	-9.952964	0.126734
European Reliance	0.016117	-0.018269	-2.277643	-2.909471	0.222156
European RN	-0.010536	0.127472	-1.619501	-1.569314	0.509486
European ROF	-0.007559	0.777991	2.344235	5.972193	0.679542
Geniki DC	-0.011745	0.475178	6.113394	1.913519	-0.004186
Geniki SV	-0.003394	0.847734	-1.182155	-1.556628	0.951324
H Protoporos	-0.005621	0.76282	-1.598193	-1.205692	0.32179
Hellenic Trust	0.001522	0.957	0.184321	-2.187502	0.976913
HSBC M	-0.005835	0.696296	-2.603267	-1.676845	0.85937
ING	-0.001663	0.93293	-0.291796	-3.3921	0.987374

[18] Source: individual calculations using E-views Program and equation (4): $\boldsymbol{\beta_i}\left(\boldsymbol{R_{mt}} - \boldsymbol{R_{ft}}\right) + \boldsymbol{\beta_{iT}}\left(\boldsymbol{R_{mt}} - \boldsymbol{R_{ft}}\right)^2 + \boldsymbol{\beta_{ic}}\left(\boldsymbol{R_{mt}} - \boldsymbol{R_{ft}}\right)^3 + \boldsymbol{\varepsilon_{it}}$ at .0% level of significance

ING DC	-0.003679	0.812122	-1.617997	-1.074028	0.9019
ING I	-0.022101	0.419947	-3.844178	-4.412196	0.197916
ING International	-0.048363	-0.219536	-6.855207	-4.501338	0.0163
ING Pireus	-0.020716	0.076518	8.786017	2.497659	0.042036
Interamerican O	-0.007529	0.488376	-8.971932	-7.712261	0.896793
Interlife	-0.006319	0.718981	-3.062557	-2.486968	0.880029
International DC	-0.007621	0.623356	-5.220919	-3.345334	0.870446
LAIKI	-0.00307	0.899895	2.303096	4.668274	0.925179
LAIKI SS	-0.003165	0.852397	-0.473199	1.692117	0.946749
Marfin Max	-0.008048	0.613735	-5.220919	-3.345334	0.870446
Marfin Med	-0.002787	0.9224558	3.084634	5.827214	0.906396
Marfin NM	-0.006515	0.706119	0.883931	5.445214	0.907326
Marfin P	-0.004932	0.727922	-4.127486	-2.08151	0.954923
Metrolife A	-0.003803	0.816377	-2.849055	-2.463825	0.983871
Metrolife I	-0.020111	0.187334	-6.625289	-5.519158	0.412258
P&K	-0.005325	0.783444	-2.413005	-1.954156	0.963388
Pireus	-0.003823	0.823209	-0.88857	-2.207084	0.908736
Pireus 1	-0.000893	0.991147	0.576414	1.856809	0.990026
Pireus DC	-0.021296	-0.066194	4.594088	2.390719	0.058214

Appendix 3: Persistence Results per Fund

AAAB[19]	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LW
1st year-half 2010 - 2nd year-half 2010	WW

[19] Source: individual calculations using E-views Program and CAPM equation on semi-annual basis for each fund separately: $\boldsymbol{R_{it} - R_{ft} = a_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it}}$ at .0% level of significance.

ALIANZ AS	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WL
1st year-half 2010 - 2nd year-half 2010	LL

ALICO	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ALICO IF	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ALICO MS	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WL
2nd year-half 2009 - 1st year-half 2010	LW
1st year-half 2010 - 2nd year-half 2010	WL

ALPHA AS	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ATE	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

ATTIKIS	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LW
1st year-half 2010 - 2nd year-half 2010	WW

CITYFUND	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

CRETEL	
1/1/2005-31/12/2005	WL
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

CYPRUS GD	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

DELOS SC	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

DELOS TOP 30	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

EUROBANK	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

INTERNATIONAL	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

MARFIN ATHEN	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LW
1st year-half 2009 - 2nd year-half 2009	WL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

MILLENNIUM BC	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WL
1st year-half 2009 - 2nd year-half 2009	LW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

MILLENNIUM MC	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

PROBANK	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WL
1st year-half 2010 - 2nd year-half 2010	LW

AAAB	
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LW
1st year-half 2007 - 2nd year-half 2007	WW

AAABGD	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW

ALPHA ETF FTSE	
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ALPHATRUST NS	
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WL
1st year-half 2009 - 2nd year-half 2009	LW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ATHENSTOP20	
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LW
1st year-half 2009 - 2nd year-half 2009	WW

ATTICA MARATHON	
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LW
1st year-half 2009 - 2nd year-half 2009	WL
2nd year-half 2009 - 1st year-half 2010	LW
1st year-half 2010 - 2nd year-half 2010	WW

DELOSHT	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WL

DELOSIC	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW

DELOSF	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW

EGNATIAT	
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW

ELTA	
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

EUROBANKFS	
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

EUROBANKLF	
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

EUROBANKLFI	
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

EUROBANKLFII	
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL

EUROBANKMIDCAP	
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL

EUROPEANRELIANCE	
1/1/2005-31/12/2005	WL
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL

GENIKISV	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

HPROTOPOROS	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	LW

HELLENICTRUST	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

HSBC M	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LL
1st year-half 2010 - 2nd year-half 2010	LL

ING	
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ING DC	
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW
1st year-half 2010 - 2nd year-half 2010	WW

ING INTERNATIONAL	
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WL

INGI G	
2nd year-half 2007 - 1st year-half 2008	LL
1st year-half 2008 - 2nd year-half 2008	LL
2nd year-half 2008 - 1st year-half 2009	LL

INGPIREUS	
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL

INTERLIFE	
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	LL
1st year-half 2009 - 2nd year-half 2009	LL
2nd year-half 2009 - 1st year-half 2010	LW
1st year-half 2010 - 2nd year-half 2010	WL

INTERNATIONALDC	
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LW
2nd year-half 2006 - 1st year-half 2007	WL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WW

LAIKI	
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW

LAIKISS	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW

MARFINMED	
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW

P&K	
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WL

MARFINNM	
1st year-half 2006 - 2nd year-half 2006	LW

MARFINP	
1/1/2005-31/12/2005	WL
2nd year-half 2005 - 1st year-half 2006	LW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW

METROLIFEA	
1/1/2005-31/12/2005	WW
2nd year-half 2005 - 1st year-half 2006	WW
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW

METROLIFEI	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LL
1st year-half 2006 - 2nd year-half 2006	LL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LL
2nd year-half 2007 - 1st year-half 2008	LW
1st year-half 2008 - 2nd year-half 2008	WL
2nd year-half 2008 - 1st year-half 2009	LL

PIREUS	
1st year-half 2006 - 2nd year-half 2006	WL
2nd year-half 2006 - 1st year-half 2007	LL
1st year-half 2007 - 2nd year-half 2007	LW
2nd year-half 2007 - 1st year-half 2008	WL
1st year-half 2008 - 2nd year-half 2008	LW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WL

PIREUS1	
1st year-half 2006 - 2nd year-half 2006	WW
2nd year-half 2006 - 1st year-half 2007	WW
1st year-half 2007 - 2nd year-half 2007	WW
2nd year-half 2007 - 1st year-half 2008	WW
1st year-half 2008 - 2nd year-half 2008	WW
2nd year-half 2008 - 1st year-half 2009	WW
1st year-half 2009 - 2nd year-half 2009	WW
2nd year-half 2009 - 1st year-half 2010	WW

PIREUSDC	
1/1/2005-31/12/2005	LL
2nd year-half 2005 - 1st year-half 2006	LL